Alternative Methods of Assessing Corn Silage Value Based on Yield and Quality

G. W. Roth, J. A. Campbell, G. A. Varga, M. H. Hall
Departments of Crop and Soil Sciences and Dairy and Animal Sciences
Penn State University, University Park, PA 16802

Introduction

In corn (Zea mays L.) silage hybrid or management trials it is often difficult to accurately assess the economic value of treatments accurately. The economic value of treatments is a function of the yield, forage quality and the cost of dairy ration adjustment to maximize milk yield. A method is needed that is flexible to adjust for the value of nutrients in the silage on individual farms.

A spreadsheet based program was developed to facilitate the evaluation and ranking of treatments based on the nutrient value, potential milk response, yield and cost of production of various treatments. The need to adjust for nutrient values is especially critical now since nutrients values have changed from historic levels.

Weiss (2001) proposed a method that estimated the nutrient value of crude protein (CP), neutral detergent fiber (NDF) and energy (NEL), combined with the potential for increased milk production based on neutral detergent fiber digestibility (NDFD) and the cost of production for each treatment. Treatments were then ranked relative to the lowest ranking treatment from an economic perspective.

Other methods of assessing corn hybrid

The objectives of this study were to:

1) Develop a spreadsheet based relative economic value approach) REVA to assess corn yield and forage quality effects on economic returns.

2) Compare hybrid rankings to Milk 2006.

Materials and Methods:

REVA Assumptions:

The value of NEL, CP, and NDF were developed using multiple regression techniques assuming corn @$140/ton, SBM@$250/ton and alfalfa hay @$150/ton. These resulted in values of $0.07/Mcal, $0.13/lb CP, and $0.048/lb NDF.

IN the REVA model,

Total economic value of nutrients= NEL value($/ton) + NDF value ($/ton) + CP value ($/ton)

Incr. in Milk Revenue ($/cow/day)= Rel. diff. in NDFD (%) * Milk inc. (0.55 lb of milk /1.0 % unit change in NDFD per cow per day) * Milk price ($0. 2/lb)

Increase in feed costs ($/cow/day)= Rel. difference in NDFD (%) * DMI increase (0.375lb DM per unit change in NDFD per cow per day) * Feed cost ($0.07/lb)

Increase in net income ($/cow/day)= Increase in milk revenue ($ /cow/day) - Increase in feed costs ($ /cow/day)

Increase in Net Income ($/ton)=Increase in net income ($/cow/day) / Corn silage intake (22 lb DM cow/day) * 2000 (lb/ton)

Production Costs ($/ton)= Establishment Cost($/ton) +Harvesting Costs($/ton)

Corn silage value ($/ton)=Total economic value of nutrients ($/ton) + Increase in Net Income ($/ton)-Production Costs ($/ton)

Corn silage value ($/ac)=Corn silage value ($ /ton) * DM yield (ton/ac)

Results

Table 1. Economic assessment of a hybrid performance trial in Crawford County PA, in 2007. Assumptions: Milk= $20/cwt, NEL=$0.07/Mcal, CP=$0.13/lb, NDF=$0.048/lb.

Hybrid	Performance measures						REVA Results		Milk 2006 Analysis			
	DM Yield	NDF	NDFD	Starch	CP	NEl	Relative difference		Milk/ton	Milk/Acre	Relative difference	
	T/A	%	%	%	%	Mcal/lb	Rank	$/acre	lbs/ton	lbs/acre	Rank	$/acre
Mycogen F2F485	6.0	39.0	60.0	34.8	8.4	0.82	**1**	**$599**	3581	22540	**5**	**$270**
NK Brand 39-Q1	7.1	37.0	52.5	38.3	8.2	0.81	**2**	**$490**	3505	22066	**6**	**$175**
Garst 8758	5.9	38.9	53.0	35.4	8.0	0.79	**3**	**$274**	3427	24928	**3**	**$747**
Dekalb DKC 48-46	5.5	37.2	54.5	36.4	7.9	0.80	**4**	**$256**	3347	24940	**2**	**$750**
King's MC500	5.8	41.7	52.8	28.0	8.6	0.77	**5**	**$246**	3368	21260	**7**	**$14**
Pioneer 38A89	6.3	39.9	50.5	35.8	8.0	0.77	**6**	**$227**	3505	22760	**4**	**$314**
Hubner 3120	6.0	38.7	51.5	35.7	8.5	0.79	**7**	**$226**	3623	21191	**8**	**$0**
Gries 8697	6.2	39.3	46.3	35.1	8.3	0.76	**8**	**$0**	3422	24997	**1**	**$761**

Table 2. Economic assessment of a hybrid performance trial in Crawford County PA, in 2007. Assumptions: Milk= $20/cwt, NEL=$0.07/Mcal, CP=$0.13/lb, NDF=$0.048/lb, no milk response to NDFD.

Hybrid	Performance measures						REVA Results		Milk 2006 Analysis			
	DM Yield	NDF	NDFD	Starch	CP	NEl	Relative difference		Milk/ton	Milk/Acre	Relative difference	
	T/A	%	%	%	%	Mcal/lb	Rank	$/acre	lbs/ton	lbs/acre	Rank	$/acre
NK Brand 39-Q1	7.1	37.0	52.5	38.3	8.2	0.81	**1**	**$267**	3505	22066	**6**	**$175**
Gries 8697	6.2	39.3	46.3	35.1	8.3	0.76	**2**	**$218**	3422	24997	**1**	**$761**
Pioneer 38A89	6.3	39.9	50.5	35.8	8.0	0.77	**3**	**$176**	3505	22760	**4**	**$314**
Hubner 3120	6.0	38.7	51.5	35.7	8.5	0.79	**4**	**$130**	3623	21191	**8**	**$0**
Garst 8758	5.9	38.9	53.0	35.4	8.0	0.79	**5**	**$95**	3427	24928	**3**	**$747**
King's MC500	5.8	41.7	52.8	28.0	8.6	0.77	**6**	**$90**	3368	21260	**7**	**$14**
Dekalb DKC 48-46	5.5	37.2	54.5	36.4	7.9	0.80	**7**	**$23**	3347	24940	**2**	**$750**
Mycogen F2F485	6.0	39.0	60.0	34.8	8.4	0.82	**8**	**$0**	3581	22540	**5**	**$270**

Summary

- Rankings between REVA and Milk 2006 are considerably different.
- Hybrids with high NDFD may be undervalued with Milk 2006.
- Rankings of REVA are sensitive to feed price relationships and potential milk response to NDFD.
- The REVA method appears to have potential to adjust hybrid performance rankings based on key on-farm variables: commodity prices and potential response to NDFD.

Acknowledgements

- Thanks are due to Dr. William Weiss, The Ohio State University, for providing insight into the valuation of nutrients in the model and for the development of the original approach to valuation of hybrids based on nutrient content and milk production
- This research was supported in part by agricultural research funds administered by The Pennsylvania Department of Agriculture.
- Thanks to Joel Hunter, Crawford County PA Cooperative Extension, for sharing hybrid performance information.